The Optimization of a Bench Scale Hydrogenation Unit
(Developed under the Contract DSS File No. OSQ80-00095, 14 SQ.23440-9-9150)

FINAL REPORT

BY

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MICROMEDIA

SCOPE OF WORK

To optimize the operation and performance of the Bench Scale Hydrogenation Unit developed under the contract DSS File No. OSQ80-00095, 14SQ.23440-9-9150 to meet the following objective.

A bitumen and coal mixture be introduced to the unit and show that the unit can be operated at steady conditions for a minimum of four hours within a ten hour run.

WORK SUMMARY

The work of optimization of the unit comprised mainly the following:

1. Slurry circulation pump was checked for head, flow rates and operating temperatures.

2. High pressure variable speed piston pump was checked for head, flow rates and operating temperatures.

3. Slurry feed tank system was modified to reduce pipe stress loadings. A proportional controller was added to the heat tracing for the lines connected to the tank, resulting in a constant loading due to pipe expansion.

4. Hot separator product let down valve trim was modified due to initial problems under start-up of introducing unreacted coal/slurry to the system.

5. Finite tuning of controllers and minor instrumentation adjustments.

6. Assistance in the installation of waste gas cooler, compressor, mass flow indicator and control and heater to allow recycling of waste gas to improve efficiency.

7. Installation of additional sampling systems to obtain intermediate analysis.

8. Test runs of varying feeds and feed rates were carried out and steady state conditions were achieved and monitored.

9. Throughout the optimization period, training, instruction and familiarization of EMR personnel was carried out of instrumentation and controls in the operation of the unit.

PROBLEMS

Size of feed tank limited options at the upper limit flow rates in the number of test runs utilizing same feed batch.

RECOMMENDATION

A separate feed tank with capability of transferring feed stock to the main feed tank was recommended.